SEQUENCE LISTING

<110> Fedida, David
Steele, David

<120> MUTATIONS OF VOLTAGE-GATED ION CHANNELS
THAT ALLOW THEM TO EXPRESS A VOLTAGE-INDEPENDENT PHENOTYPE
AND AN IMPROVED METHOD TO USE THE SAME

<130> 480102.425USPC

<140> US
<141> 2003-07-14

<150> US 60/395,272
<151> 2002-07-12

<160> 13

<170> FastSEQ for Windows Version 4.0

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<212> DNA
<213> Homo sapiens

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attgccctgc ctgtggacgt catcgtctcc aac 33

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<400> 4
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<210> 5
<211> 159
<212> PRT
<213> Homo sapiens

<400> 5
Pro Tyr Phe Ile Thr Leu Gly Thr Glu Ile Ala Glu Gln Glu Gly Asn
 1   5   10   15
Gln Lys Gly Glu Gln Ala Thr Ser Leu Ala Ile Leu Arg Val Ile Arg
            20   25   30
Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly
        35   40   45
Leu Gln Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu Gly
    50   55   60
Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser Ala
65   70   75   80
Val Tyr Phe Ala Glu Ala Glu Glu Ala Glu Ser His Phe Ser Ser Ile
                85   90   95
Pro Asp Ala Phe Trp Trp Ala Val Val Ser Met Thr Thr Val Gly Tyr
            100   105   110
Gly Asp Met Tyr Pro Val Thr Ile Gly Gly Lys Ile Val Gly Ser Leu
        115   120   125
Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile
    130   135   140
Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu
145   150   155

<210> 6
<211> 160
<212> PRT
<213> Mus Musculus

<400> 6
Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Lys Pro Glu Asp
 1   5   10   15
Ala Gln Gln Gly Gln Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile
            20   25   30
Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys
        35   40   45
Gly Leu Gln Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu
    50   55   60
Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser
65   70   75   80
Ala Val Tyr Phe Ala Glu Ala Asp Glu Arg Asp Ser Gln Phe Pro Ser
                85   90   95
Ile Pro Asp Ala Phe Trp Trp Ala Val Val Ser Met Thr Thr Val Gly
            100   105   110
Tyr Gly Asp Met Val Pro Thr Thr Ile Gly Gly Lys Ile Val Gly Ser
        115   120   125
Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val
    130   135   140
Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu
145   150   155   160

<210> 7
<211> 161
<212> PRT
<213> Homo sapiens

<400> 7
Pro Tyr Phe Ile Thr Leu Gly Thr Asp Leu Ala Gln Gln Gln Gly Gly
1 5 10 15
Gly Asn Gly Gln Gln Gln Gln Ala Met Ser Phe Ala Ile Leu Arg Ile
20 25 30
Ile Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser
35 40 45
Lys Gly Leu Gln Ile Leu Gly His Thr Leu Arg Ala Ser Met Arg Glu
50 55 60
Leu Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser
65 70 75 80
Ser Ala Val Tyr Phe Ala Glu Ala Asp Glu Pro Thr Thr His Phe Gln
85 90 95
Ser Ile Pro Asp Ala Phe Trp Trp Ala Val Val Thr Met Thr Thr Val
100 105 110
Gly Tyr Gly Asp Met Lys Pro Ile Thr Val Gly Gly Lys Ile Val Gly
115 120 125
Ser Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro
130 135 140
Val Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Asn
145 150 155 160
Glu

<210> 8
<211> 157
<212> PRT
<213> Homo sapiens

<400> 8
Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Arg Gln Gly Asn
1 5 10 15
Gly Gln Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile Arg Leu Val
20 25 30
Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly Leu Gln
35 40 45
Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu Gly Leu Leu
50 55 60
Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser Ala Val Tyr
65 70 75 80
Phe Ala Glu Ala Asp Asp Pro Thr Ser Gly Phe Ser Ser Ile Pro Asp
85 90 95
Ala Phe Trp Trp Ala Val Val Thr Met Thr Thr Val Gly Tyr Gly Asp
100 105 110
Met His Pro Val Thr Ile Gly Gly Lys Ile Val Gly Ser Leu Cys Ala
115 120 125
Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile Val Ser

```
    130                 135                 140
Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu
145                 150                 155
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<210> 9
<211> 164
<212> PRT
<213> Homo sapiens

<400> 9

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Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Gln Gln Pro Gly
 1               5                  10                  15
Gly Gly Gly Gly Gly Gln Asn Gly Gln Gln Ala Met Ser Leu Ala Ile
            20                  25                  30
Leu Arg Val Ile Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser
        35                  40                  45
Arg His Ser Lys Gly Leu Gln Ile Leu Gly Lys Thr Leu Gln Ala Ser
    50                  55                  60
Met Arg Glu Leu Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile
65                  70                  75                  80
Leu Phe Ser Ser Ala Val Tyr Phe Ala Glu Ala Asp Asn Gln Gly Thr
                85                  90                  95
His Phe Ser Ser Ile Pro Asp Ala Phe Trp Trp Ala Val Val Thr Met
            100                 105                 110
Thr Thr Val Gly Tyr Gly Asp Met Arg Pro Ile Thr Val Gly Gly Lys
        115                 120                 125
Ile Val Gly Ser Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu
    130                 135                 140
Pro Val Pro Val Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu
145                 150                 155                 160
Thr Asp His Glu
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<210> 10
<211> 171
<212> PRT
<213> Drosophila melagaster

<400> 10

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Pro Tyr Phe Ile Thr Leu Ala Thr Val Val Ala Glu Glu Glu Asp Thr
 1               5                  10                  15
Leu Asn Leu Pro Lys Ala Pro Val Ser Pro Gln Asp Lys Ser Ser Asn
            20                  25                  30
Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile Arg Leu Val Arg Val
        35                  40                  45
Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly Leu Gln Ile Leu
    50                  55                  60
Gly Arg Thr Leu Lys Ala Ser Met Arg Glu Leu Gly Leu Leu Ile Phe
65                  70                  75                  80
Phe Leu Phe Ile Gly Val Val Leu Phe Ser Ser Ala Val Tyr Phe Ala
                85                  90                  95
Glu Ala Gly Ser Glu Asn Ser Phe Phe Lys Ser Ile Pro Asp Ala Phe
            100                 105                 110
```

```
Trp Trp Ala Val Val Thr Met Thr Thr Val Gly Tyr Gly Asp Met Thr
        115                 120                 125
Pro Val Gly Val Trp Gly Lys Ile Val Gly Ser Leu Cys Ala Ile Ala
    130                 135                 140
Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile Val Ser Asn Phe
145                 150                 155                 160
Asn Tyr Phe Tyr His Arg Glu Thr Asp Gln Glu
                165                 170
```

<210> 11
<211> 163
<212> PRT
<213> Rattus norvegicus

<400> 11

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Pro Phe Tyr Leu Glu Val Gly Leu Ser Gly Leu Ser Ser Lys Ala Ala
 1               5                  10                  15
Lys Asp Val Leu Gly Phe Leu Arg Val Val Arg Phe Val Arg Ile Leu
            20                  25                  30
Arg Ile Phe Lys Leu Thr Arg His Phe Val Gly Leu Arg Val Leu Gly
        35                  40                  45
His Thr Leu Arg Ala Ser Thr Asn Glu Phe Leu Leu Leu Ile Ile Phe
    50                  55                  60
Leu Ala Leu Gly Val Leu Ile Phe Ala Thr Met Ile Tyr Tyr Ala Glu
65                  70                  75                  80
Arg Ile Gly Ala Gln Pro Asn Asp Pro Ser Ala Ser Glu His Thr His
                85                  90                  95
Phe Lys Asn Ile Pro Ile Gly Phe Trp Trp Ala Val Val Thr Met Thr
            100                 105                 110
Thr Leu Gly Tyr Gly Asp Met Tyr Pro Gln Thr Trp Ser Gly Met Leu
        115                 120                 125
Val Gly Ala Leu Cys Ala Leu Ala Gly Val Leu Thr Ile Ala Met Pro
    130                 135                 140
Val Pro Val Ile Val Asn Asn Phe Gly Met Tyr Tyr Ser Leu Ala Met
145                 150                 155                 160
Ala Lys Gln
```

<210> 12
<211> 156
<212> PRT
<213> Rattus norvegicus

<400> 12

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Pro Tyr Tyr Val Thr Ile Phe Leu Thr Glu Ser Asn Lys Ser Val Leu
 1               5                  10                  15
Gln Phe Gln Asn Val Arg Arg Val Val Gln Ile Phe Arg Ile Met Arg
            20                  25                  30
Ile Leu Arg Ile Leu Lys Leu Ala Arg His Ser Thr Gly Leu Gln Ser
        35                  40                  45
Leu Gly Phe Thr Leu Arg Arg Ser Tyr Asn Glu Leu Gly Leu Leu Ile
    50                  55                  60
Leu Phe Leu Ala Met Gly Ile Met Ile Phe Ser Ser Leu Val Phe Phe
```

65 70 75 80
Ala Glu Lys Asp Glu Asp Asp Thr Lys Phe Lys Ser Ile Pro Ala Ser
85 90 95
Phe Trp Trp Ala Thr Ile Thr Met Thr Thr Val Gly Tyr Gly Asp Ile
100 105 110
Tyr Pro Lys Thr Leu Leu Gly Lys Ile Val Gly Gly Leu Cys Cys Ile
115 120 125
Ala Gly Val Leu Val Ile Ala Leu Pro Ile Pro Ile Ile Val Asn Asn
130 135 140
Phe Ser Glu Phe Tyr Lys Glu Gln Lys Arg Gln Glu
145 150 155

<210> 13
<211> 149
<212> PRT
<213> Homo sapiens

<400> 13
Pro Tyr Tyr Ile Gly Leu Val Met Thr Asp Asn Glu Asp Val Ser Gly
1 5 10 15
Ala Phe Val Thr Leu Arg Val Phe Arg Val Phe Arg Ile Phe Lys Phe
20 25 30
Ser Arg His Ser Gln Gly Leu Arg Ile Leu Gly Tyr Thr Leu Lys Ser
35 40 45
Cys Ala Ser Glu Leu Gly Phe Leu Leu Phe Ser Leu Thr Met Ala Ile
50 55 60
Ile Ile Phe Ala Thr Val Met Phe Tyr Ala Glu Lys Gly Ser Ser Ala
65 70 75 80
Ser Lys Phe Thr Ser Ile Pro Ala Ala Phe Trp Tyr Thr Ile Val Thr
85 90 95
Met Thr Thr Leu Gly Tyr Gly Asp Met Val Pro Lys Thr Ile Ala Gly
100 105 110
Lys Ile Phe Gly Ser Ile Cys Ser Leu Ser Gly Val Leu Val Ile Ala
115 120 125
Leu Pro Val Pro Val Ile Val Ser Asn Phe Ser Arg Ile Tyr His Gln
130 135 140
Asn Gln Arg Ala Asp
145